

Development of gas turbine spray test rig for biofuel

Abstract

The design of the fuel supply system to be used for biofuel is one of the systems that are complicated to design. As this system involves a lot of components, all the components in this design play an important role to ensure that the objective of the system is achieved. The purpose of the fuel supply system for gas turbine combustor is to apply the fuel to the combustion chamber through an atomizer to burn and produce 100kW of power. The hollow cone fine spray nozzle, 1.1 mm in diameter was chosen as the atomizer. To evaluate the atomization behavior of palm biofuel blends as an alternative fuel, the physical properties of biofuel blends were determined. These parameters were used to compare the Sauter Mean Diameter (SMD) and the spray cone angle of the various fuel blends. The spray angle of this fuel is around 70 to 84 degrees at pressure around 7 to 9 bars. The main components such as fuel tank, pumps, filters, valves, fuel piping and flow meter had been chosen systematically. This method is used to analyze the components by simulating the real flow process in the fuel system works. Besides that, to test the fuel supply system performance, tests had been conducted using the PDA and the spray characteristics of biofuel were observed. Therefore the characteristics of biofuel such as fuel droplet velocity and size had been obtained from this experimental.